

Western Gulf States, 29° at Little Rock and 35 at Vicksburg to 46° at Indianola; Ohio valley and Tennessee, 25° at Louisville and 29° at Morgantown to 44° at Memphis and 50° at Chattanooga; Lower Lake region, 25° at Detroit and 26° at Erie to 37° at Oswego; Upper Lake region, 21° at Grand Haven and 28° at Alpena to 35° at Duluth; Upper Mississippi valley, 30° at Keokuk and 38° at St. Paul to 42° at Des Moines; Red River of the North valley, 36° at Breckenridge and Pembina; Missouri valley, 31° at Omaha to 40 at Bismarck and 42° at Ft. Buford; Texas, 37° at Mason to 40° at Davis, 45° at Rio Grande, Concho and Brackettsville, and 67° at Ft. Elliott; Eastern Rocky Mountain slope, 24° at Dodge City and 34° at Ft. Gibson to 51° at North Platte; Rocky Mountains, 35° at Socorro to 41° at Virginia City, 46° on Pike's Peak and 61° at Denver; Northern and Middle Plateau Districts, 22° at Boise City to 27° at Pioche and 30° at Winnemucca; California, 14° at San Francisco to 28° at Visalia, 29° at Red Bluff and 33° at Los Angeles.

*Frost* was reported very generally from all States and Territories north of the 35th parallel. In Florida on the 16th, 17th, 18th, 26th, 27th and 28th, in the remaining states of the East Gulf, 1st, 6th, 7th, 12th, 13th, 15th to 18th, 25th to 28th. West Gulf States, 1st, 3rd, 7th, 11th to 19th, 21st, 24th to 27th; at Lake Charles, La., 25th, "intensely cold, all tender vegetation killed, a thing never known in this section before." Indian Territory, 1st, 3rd, 5th, 6th, 7th to 20th, 24th, to 31st. Arizona, 10th, 16th, 18th, 23rd to 31st, very heavy. California, 2nd, 3rd, 4th, 6th, 7th, 8th to 12th, 14th to 18th, 21st to 31st; at Los Angeles, on the 25th, plants and vegetables in many localities entirely destroyed.

*Ice* formed generally throughout the northern sections of the country, as will be seen by reference to the chapter on Navigation. In the Eastern Gulf States it formed on the 24th, 25th, 26th and 27th; Western Gulf States, 12th, 13th, 25th, 26th and 27th; Texas and Indian Territory, 6th, 12th, 13th, 14th, 24th, 25th, 26th and 27th. California, at San Francisco, on the 24th; Los Angeles, 25th; Visalia, 23d and 25th; Red Bluff, 23d, 24th, (25th 2½ inches;) Sacramento, 23d, 24th and 25th; Hooker's Lake, below the city, frozen over sufficiently solid for skating—first time in twenty-five years. On the 25th the water pipes in the city frozen up. Washington, 25th, shallow water ponds frozen over.

*Ground Frozen.*—Lompoc, Cal., 24th, ½ inch, 31st; Lake Charles, La. 25th; Brookhaven, Miss., 26th and 7th; Melissa, Tex., 11th; Sacramento, Cal., 23rd, 24th and 25th; Red Bluff, Cal., 24th and 25th; Visalia, Cal., 23d and 25th; Prescott, Ariz., 25th; Keokuk, Ia., ground remained frozen throughout the month.

The following notes are of interest as indicating the *excessive cold* of the month, in various sections:—Logan, Ia., 19th, -20°, the coldest day, at noon, in the past twenty years; Melissa, Tex., 24th, 12:15 p. m., heavy north wind, with snow and sleet, freezing as it fell; chickens were frozen fast to limbs of trees; ice formed on tanks to the depth of three inches, and the snow formed a crust so firm and hard that a horse's hoof made no impression. Coalville, Utah, 24th, -22°, coldest day in fourteen years. Humboldt Wells, Broncho and Truckee, Cal., 26th, excessively cold, mercury frozen. Prescott, Ariz., 25th, -18°, supposed to be the lowest temperature ever known in the territory. Virginia City, Montana, 24th, 1,500 sheep frozen to death and several herders badly frozen; 23rd to 26th, ranchmen reported a storm of wind and snow of unprecedented severity, all mails stopped and several mail-coaches lost. North Platte, Dak., 11th, mail-carrier frozen to death; 24th, -32°, coldest ever known here. Bismarck, Dak., 24th, -38, lowest temperature ever recorded at this station. Breckenridge, 13th, two children and one man frozen to death. San Antonio, Tex., 25th, many cattle and sheep have died in this section from excessive cold. Boerne, Tex., 25th, 26th, most extreme cold for many years; telegraph battery frozen solid. Brackettsville; Tex., 25th, telegraph battery frozen solid. Brownsville, Tex., 25th, many sheep have perished from excessive cold. Pembina, Dak., heavy "blizzard" from the northwest, accompanied by a blinding snow-storm, blocking highways and obstructing railway communication.

## PRECIPITATION.

The general distribution of the rain-fall, (which includes melted snow,) will be found upon chart No. III, as accurately as it has been possible to illustrate the same. The data has been taken from the reports from nearly five hundred stations. Upon the left side of the chart is given a table of average precipitation for December. An examination of the same will show that there has been an excess in California, the Missouri valley, Minnesota, Eastern Gulf States, Middle Atlantic States, New England, St. Lawrence valley, Lake region, Ohio valley and Tennessee; greatest in the last section, where it amounted to nearly five inches, and least in the Eastern Gulf States. In the other districts there has been a deficiency; least in the Upper Mississippi valley, and greatest in the Western Gulf States, where over two inches less than the average has fallen.

*Special Heavy Rains.*—5th, \*White Plains, N. Y., 5th and 6th, 4.45 in.; \*Ft. Barrancas, Fla., 5.43 inches in 5 hrs and 20 min.; Yreka, Cal., 3.54 in. 6th, \*Fayetteville, N. C., 3.00 in. 10th, \*McMinnville, Tenn., 10th and 11th, 2.50 in.; \*Austin, Tenn., 9th and 10th, 2.62; \*Ft. Barrancas, Fla., 1.74 inches in 3 hrs and 40 min.; Memphis, Tenn., 9th and 10th, 3.50 in.; Helena, Ark., 9th and 10th, 3.32 in.; Paducah, Ky., 9th and 10th, 3.99 in. 11th, Knoxville, Tenn., 2.46 in.; Chattanooga, Tenn., 10th and 11th, 3.10 in.; \*Brookhaven, Miss., 10th and 11th, 2.30 in.; \*Ft. Barrancas, Fla., 2.33. 13th, \*Gainesville, Ga., 13th and 14th, 4.40 in.; \*Dover Mines, Va., 13th and 14th, 3.20 in.; \*Forsyth, Ga., 13th and 14th, 3.15 in.; \*Lenoir, N. C., 13th and 14th, 3.30 in.; \*Franklin, N. C., 13th and 14th, 3.20 in.; \*Highlands, N. C., 13th and 14th, 3.85 in.; \*White Plains, N. Y., 13th and 14th, 2.20 in. 14th, Montgomery, Ala., 2.66 in.; Atlanta, Ga., 3.76 in.; Charlotte, N. C., 2.38 in.; Lynchburg, Va., 2.98 in.; Sandy Hook, N. J., 2.45 in.; \*Ft. Barrancas,

Fla., 2.33 in. 19th, Red Bluff, Cal., 5.04 in.; \*Lompoc, Cal., 18th and 19th, 3.62 in.; \*San Geronio, Cal., 19th and 20th, 4.24 in. 20th, \*Austin, Tenn., 2.30 in.; Los Angeles, Cal., 4.19 in.; 21st, \*White Plains, N. Y., 2.00 in. 22nd, Knoxville, Tenn., 22nd and 23rd, 2.81 in. 23rd, \*Laconia, Ind., 23rd and 24th, 3.80 in. 24th, \*Vevay, Ind., 2.50 in.; \*College Hill, Ohio, 24th, 25th, 2.75 in.; \*McMinnville, Tenn., 24th and 25th, 3.75 in.; Morgantown, W. Va., 24th and 25th, 2.57 in.; \*Austin, Tenn., 22nd to 24th, 4.25 in.; Evansville, Ind., 3.00 in. 25th, \*Murphy, N. C., 24th and 25th, 3.40 in.; Paducah, Ky., from 22nd to 25th, 6.69 in. 27th, \*San Geronio, Cal., 26th to 28th, 4.20 in. 30th, \*Northport, Mich., 30th and 31st, 3.75 in. 31st, Paducah, Ky., 30th and 31st, 4.51 in.

*Largest Monthly Rain-falls, including Melted Snow.*—Paducah, Ky., 20.12 inches; \* Ft. Barrancas, Fla., 15.46; \*White Plains, N. Y., 12.60; Olympia, Washington Ty., 11.42; \*Northport, Mich., 10.32; \*Austin, Tenn., 10.20; Red Bluff, Cal., 9.95; \*Ashwood, Tenn., 9.60; \*Highlands, N. C., 9.40; \*San Geronio, Cal., 9.39; Nashville, 9.15; \*Evansville, Ind., 8.97; \*Gainesville, Ga., 8.75; Memphis, 8.51; Chattanooga and \*McMinnville, Tenn., 8.47; \*Murphy, N. C., 8.30; Knoxville, 8.28; \*Fayetteville, N. C., 8.25; \*Laconia, Ind., 8.21; Sandy Hook, N. J., 8.02; Louisville, 7.93; Roseburg, Or., 7.86; Atlanta, 7.84; \*Vevay, Ind., 7.60; Montgomery, 7.42; \*Grafton, N. H., 7.40; Portland, Or., 7.36; \*Trenton, N. J., 7.25; Cincinnati, 7.11; \*Freehold, N. J., 6.77; \*St. Meinrad, Ind., 6.66; Morgantown, 6.70; Barnegat, 6.68; Cairo, 6.63; \*Franklin, N. C., 6.60; Los Angeles and \*Quebec, 6.53; Vicksburg, 6.45.

*Smallest Monthly Rain-falls, including Melted Snow.*—Fort Davis and Stockton, Tex., none; Socorro, N. M., 0.01 inches; Laredo, Tex. and \*Fort Sidney, Neb., 0.06; Uvalde, Tex., 0.09; Fort Elliott, Tex., 0.10; Dodge City and \*Fort Union, N. M., 0.12; Pilot Point, Tex., 0.13; Cheyenne, 0.17; Concho, Tex., 0.18; \*Gulf Hammock, Fla., 0.20; Castroville, Tex., 0.23; El Paso, Tex., 0.24; \*Fort McPherson, Neb., 0.26; Yuma, Ariz., 0.27; Eagle Pass, Tex., 0.29; Denver, 0.33; Coleman, Tex., 0.34; North Platte, 0.37; Boerne, Tex., 0.39; Fort Sill, 0.45; Jacksonville, 0.46; Mason and San Antonio, Tex., 0.47; Silver City, N. M., 0.49; Fort McKavett, Tex., and Santa Fe, 0.50; Fort Griffin, Tex., 0.51; Punta Rassa and Mayport, Fla., 0.52.

*Rainy Days.*—The number of days on which rain or snow has fallen, varies as follows:—New England, 9 to 26; Middle Atlantic States, 11 to 20; South Atlantic States, 8 to 15; Eastern Gulf States, 6 to 14; Western Gulf States, 7 to 14; Lower Lake region, 21 to 26; Upper Lake region, 15 to 24; Ohio valley and Tennessee, 14 to 23; Upper Mississippi valley, 11 to 22; Missouri valley, 8 to 16; Red River of the North valley, 8 to 11; Eastern Rocky Mountain Slope, 3 to 16; Texas, 0 to 11; Rocky Mountains, 1 to 15; Middle Plateau, 9 to 20; California, 9 to 12; Oregon, 21 to 26.

*Cloudy Days.*—The number varies in New England from 12 to 23; Middle Atlantic States, 10 to 20; South Atlantic States, 5 to 14; Eastern Gulf States, 1 to 14; Western Gulf States, 10 to 17; Lower Lake region, 18 to 29; Upper Lake region, 12 to 26; Ohio valley and Tennessee, 10 to 24; Upper Mississippi valley, 11 to 19; Missouri valley, 9 to 15; Red River of the North valley, 12 to 15; Eastern Rocky Mountain Slope, 7 to 11; Texas, 2 to 12; Rocky Mountains, 1 to 14; Middle Plateau, 5 to 22; California, 8 to 12; Oregon, 21 to 27.

*Hail* was reported from the various states on the following days: Pennsylvania, 31st; Virginia, 21st; Ohio, 19th, 24th; Missouri, 19th, 20th, 30th; Kansas, 9th, 30th; Indian Territory, 4th, 30th; Texas, 4th, 5th, 24th.

*Snow* fell on the following dates in the various districts: New England, 2nd, 3rd, 6th to 31st. Middle Atlantic States, 8th, 9th, 10th, 13th to 31st. Ohio Valley, 6th, 7th, 8th, 12th to 26th, 28th to 31st. Tennessee, 25th. Lower Lake region, 6th, 8th, 9th, 11th to 31st. Upper Lake region, 1st to 4th, 6th to 9th, 11th to 31st. Upper Mississippi valley, 1st to 11th, 13th to 31st. Missouri Valley, 1st to 23rd, 25th, 27th, 28th, 30th. Mississippi, at Vicksburg, 25th, 26th. Louisiana, at Shreveport, 25th. Texas, northeastern quarter, 13th, 24th. Arkansas, Little Rock, 24th. Indian Territory, 20th, 24th, 30th. Rocky Mountains, 3rd to 14th, 16th to 25th, 27th to 30th. Arizona, 23rd, 24th, 27th, 28th, 29th. Western Plateau, 3rd to 5th, 7th to 13th, 18th to 23rd, 26th to 30th. California, Red Bluff, 28th. San Geronio, 21st, 22nd, 28th, 29th. Washington Territory, 5th, 6th, 8th to 12th, 17th to 22nd, 25th.

*Largest Monthly Snow-falls.*—Marquette, 56.50 inches; Mt. Washington, 54.50 in.; Oswego, 44.50 in.; Duluth, 39.25 in.; Virginia City, 38.50 in.; \*Northport, Mich., 37.75 in.; Alpena, 32.50 in.; \*Grafton, N. H., \*Newport, Vt., and Buffalo, 29.00 in.; Pike's Peak, 27.00 in.; \*Rowe, Mass., 25.50 in.; \*Strafford, Vt., 25.00 in.; St. Paul, 23.00 in.; Pembina, 22.00 in.; \*Cornish, Me., 21.00 in.; \*Antrim, N. H., 19.50 in.; \*Palermo, N. Y., 19.25 in.; \*Orono, Me., 19.00 in.; \*Neillsville, Wis., 18.50 in.; \*Little Mountain, Ohio, 18.00 in.; \*Coalville, Utah, 17.75 in.; Ft. Buford, Dak., 16.80 in.; \*Nora Springs, Iowa, \*Clinton, Mass., and Milwaukee, 16.50 in.; \*Argyle, N. Y., and Winnemucca, 15.50 in.; \*Newburyport, Mass., 13.75 in.; \*Somerset, Mass., \*Dunbarton, N. H., and Salt Lake City, 13.50 in.; \*Cooperstown and \*Flushing, N. Y., 13.00 in.; LaCrosse, \*Manitowoc, Wis., and Bismarck, 12.50 in.

Those stations marked with a star, (\*) have been reported by Voluntary Observers, or U. S. Army Post Surgeons.

*The depth of snow on ground at end of month* was reported as follows:—in Maine, from 4 to 12 inches; New Hampshire, 15 in.; Vermont, 2 to 18 in.; Massachusetts, trace on the coast to 18 in. in the interior; Connecticut, 2 to 3 in.; Rhode Island, 2 in.; New York,  $\frac{1}{2}$  to 12 in.; Pennsylvania,  $\frac{1}{2}$  to 7 in.; New Jersey, trace to 2 $\frac{1}{2}$  in. in the interior; Ohio,  $\frac{1}{2}$  along lake coast to 5 in. in the interior; Michigan, northern peninsula, 5 $\frac{1}{2}$  to 10 in.; southern peninsula, 2 in. at Port Huron to 24 in. at Northport; Wisconsin, 2 to 6 in.; Illinois, 0.7 to 5 in.; Missouri, trace to 2 in. in northern half; Iowa, trace to 9 $\frac{1}{2}$  in.; Minnesota, 7 to 25 in.;

Dakota, 1 to 23 in.; Nebraska,  $\frac{1}{2}$  to  $8\frac{1}{2}$  in.; Kansas,  $1\frac{1}{4}$  to 3 in.; Colorado, 24 in. on summit of Pikes Peak; Montana, 1 in. at Virginia City; Utah, 3 to 8 in.; Nevada, trace to 7 in.; California, 1 in. at San Geronio, near Visalia at an elevation of 3,000 ft., 20 in., and at 11,000 ft., 108 in.

*Snow from a cloudless sky.*—Milwaukee, Wis., 10th; Burlington, Vt., 19th.

*Floods.*—Los Angeles, Cal., 20th, mountain streams badly swollen from heavy rains, washing away roads and bridges and interrupting rail-road communication for 36 hours. Phoenix, Ariz., 29th, unusually heavy rain-storm, river rose ten feet in two days, causing slight damage. Cape May, N. J., 14th, city flooded by high tides, submerging rail-road tracks, extinguishing locomotives' fires, stopping trains and causing passengers to be brought to the city in boats; two hundred yards of sea-wall washed away. Morgantown, West Va., 25th, the inner wall of canal-lock, near Hoard's Rock, partly carried away by the freshet.

*Droughts.*—San Antonio, Tex., 1st, everything suffering for want of rain; the present drought is unprecedented, its severity causing a check upon immigration. Melissa, Tex., 18th to 23rd, streams mostly dried up and also wells, cisterns and springs.

## RELATIVE HUMIDITY.

The percentages of mean relative humidity for the month range as follows: New England, 73 to 83; Middle Atlantic States, 70 to 84; South Atlantic States, 70 to 87; Eastern Gulf States, 76 to 86; Western Gulf States, 62 to 81; Ohio valley and Tennessee, 66 to 78; Lower Lake region, 72 to 82; Upper Lake region, 69 to 81; Upper Mississippi valley, 66 to 74; Missouri valley, 67 to 94; Red River of the North valley, 98 to 99; Eastern Rocky Mountain Slope, 52 to 69; Texas, 20 at Stockton to 83 at Rio Grande; Western Plateau, 43 to 75; California, 68 to 84; Oregon, 78 to 86. *High stations* report the following averages not corrected for altitude: Pike's Peak, 70.1; Denver, 58.8; Cheyenne, 47.9; Virginia City, 62.8; Santa Fe, 49.9; Mt. Washington, 86.4 per cent.

## WINDS.

The prevailing winds, at the Signal Service stations, are indicated on chart No. II by the arrows, which fly with the wind. The *maximum* hourly velocities, as recorded by self-registers, have been noted in descriptions of the movements of areas of low and high pressure.

*Total Movements of the Air.*—The following are the *largest* total movements recorded in miles at the Signal Service stations during the month: on the summit of Pike's Peak, 20,984 miles; Sandy Hook, 12,066; Thatcher's Island, 11,455; Cape May, 11,387; Indianola, 10,739; Milwaukee, 10,700; Cape Lookout, 10,414; Kitty Hawk, 10,324; Sandusky, 10,012; Barnegat, 10,005; Wood's Holl, 9,930; Cape Henry, 9,710; Cheyenne, 9,502; Fort Sill, 9,144; Eastport, 8,868; Cape Hatteras, 8,843; Breckenridge, 8,728; Dodge City, 8,646. The *smallest* are: Deadwood, 1,740 miles; Visalia, 1,769; La Mesilla, 2,138; Augusta, 2,194; Lynchburg, 2,362; Uvalde, Tex., 2,794; Nashville, 2,817; Baltimore, 3,005; Silver City, N. M., 3,080; Virginia City, 3,078; La Crosse, 3,156; Los Angeles, 3,387; Savannah, 3,500; Eagle Pass, Tex., and Salt Lake City, 3,604; Fort Buford, Dak., 3,606; Laredo, 3,644; Boise City, 3,707; San Antonio, Tex., 3,727; Springfield, Mass., 3,811; Charlotte, N. C., 3,946.

*Local Storms.*—Winnemucca, Nev., 16th, p. m., a severe whirlwind passed from southwest to northeast, causing considerable damage, track one mile wide and lasting fifteen minutes. Colorado Springs, Col., 28th, violent gale from the west, destroying fences, signs and buildings; at a point 12 miles north of station a parlor car and one engine were lifted from the track and thrown down an embankment. Renick, Randolph Co., Mo., 9th, a severe tornado passed near the town at about 4 p. m., causing great havoc. The storm first appeared in the shape of a dense rolling cloud, hiding the sun and making it appear for miles as dark as night. The first warning of the tornado was signaled by a little black speck to the south-east of the town, which gradually grew larger until it seemed to cover the whole heavens, when the wind increased to hurricane violence. Many buildings were literally torn to pieces; fences and grain-stacks scattered in every direction, and portions of the railroad track torn up and carried great distances. Several animals were killed outright and many persons badly injured. The track of the storm was very narrow and the storm lasted but a few moments. Parker's station, Scott Co., Mo., 10th, a severe wind-storm passed over this point between twelve and one o'clock p. m., destroying several large sheds, each 100 feet in stored length, with staves, scattering the material in every direction. Two buildings were unroofed, large trees were uprooted and many fences and outbuildings entirely destroyed. Burlington, Vt., 24th, very severe wind-storm, snow piled in heavy drifts, several sheds and other buildings blown down and much damage to other property.

*Sand-storms.*—Coleman, Tex., 4th and 9th; Fort Garland, Col., 8th; Yuma, Ariz., 24th and 25th—very violent.

## VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily indications for December, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 85.7 per cent. The percentages for the four elements are: Weather, 88.1; Direction of the Wind, 81.5; Temperature, 87.7; Barometer, 85.4 per cent. By geographical district they are for New England, 89.4; Middle States, 84.7; South Atlantic States, 85.1; Eastern Gulf States, 85.9; Western Gulf States, 85.6; Lower Lake region, 87.8; Upper Lake region, 84.4; Tennessee and the Ohio valley, 83.9; Upper Mississippi